July 2023 Monthly Weather Report

This document provides a summary of the UK's weather and climate statistics for July 2023.

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UK overview

July was an unsettled month - often cool, dull, windy and with a lot of rainfall, in stark contrast to June. The jet stream was generally shifted much further south than in June, with the weather often rather autumnal in character. Any hints of drier and warmer weather proved short-lived. Through the month, a succession of frontal systems made regular west-to-east progress across the UK. Although there was a brief very warm spell around the 7th-9th, the hottest places just touching 30°C, this soon broke down with thunderstorms.

Temperatures were generally below average, particularly daily maximum temperatures, frequently failing to reach above 20°C. Rainfall was above average throughout the UK, with more than 200% of average across the west of Northern Ireland, Lancashire, Merseyside and the Manchester area and parts of Devon, Dorset and Wiltshire. The UK overall rainfall total was 170% of average overall, making this provisionally the wettest July since 2009 and sixth wettest July in the series. Northern Ireland provisionally recorded its wettest July on record with 207%, just ahead of July 1936. Sunshine was below normal, particularly across southern and western areas with the UK recording 81%.

Reference climatology used for calculating anomalies is the period 1991-2020 unless otherwise stated.

Weather impacts

- **Various impacts from the often unseasonably wet and windy weather – mostly flood-related.**

With barely a dry day nation-wide, windy conditions and often rather low temperatures, there were various weather impacts through the month. On the 6th, the Tiree music festival became a victim of the unsettled weather as it was forced to cancel a day before the start due to reported strong winds impacting camp sites and more windy weather forecast. On the 8th, there were various reports of road flooding in parts of north-east Wales and Liverpool. There were also reports of road and surface water flooding around Birmingham and in Matlock, Derbyshire with a number of properties suffering surface water ingress. The 9th saw further thunderstorm activity across Northern Ireland with reports of lightning damage to rail signalling in the evening, whilst in central Scotland heavy rain on the 10th led to localised flooding of the rail line between Glasgow, Lanark and Edinburgh. Localized intense rainfall on the 11th in the Birmingham area also disrupted rail services.

The weekends of the 15th to 16th and 22nd to 23rd brought further reports of disruption as low-pressure centres crossed the UK. Northern Ireland Electricity reported a large-scale fault shortly after midnight on the 15th, lightning being the suspected culprit. Heavy downpours and gusty winds were blamed for multiple reports of flooded roads and downed trees across Northern Ireland, and the Tyne and Wear metro also suffered flooding. A week later the rainfall was most persistent across Northern Ireland and North West England, with further reports of localized flooding. Rail services in North West England were affected including the West Coast Main Line. The Garstang flood basin was opened to ease the pressure off local rivers while several properties were flooded with at least two rescues of drivers from stranded vehicles on flooded sections of roads.

The final week of the month saw further unsettled weather with localized surface water flooding in Scarborough as the local drains struggled to cope with excess water.

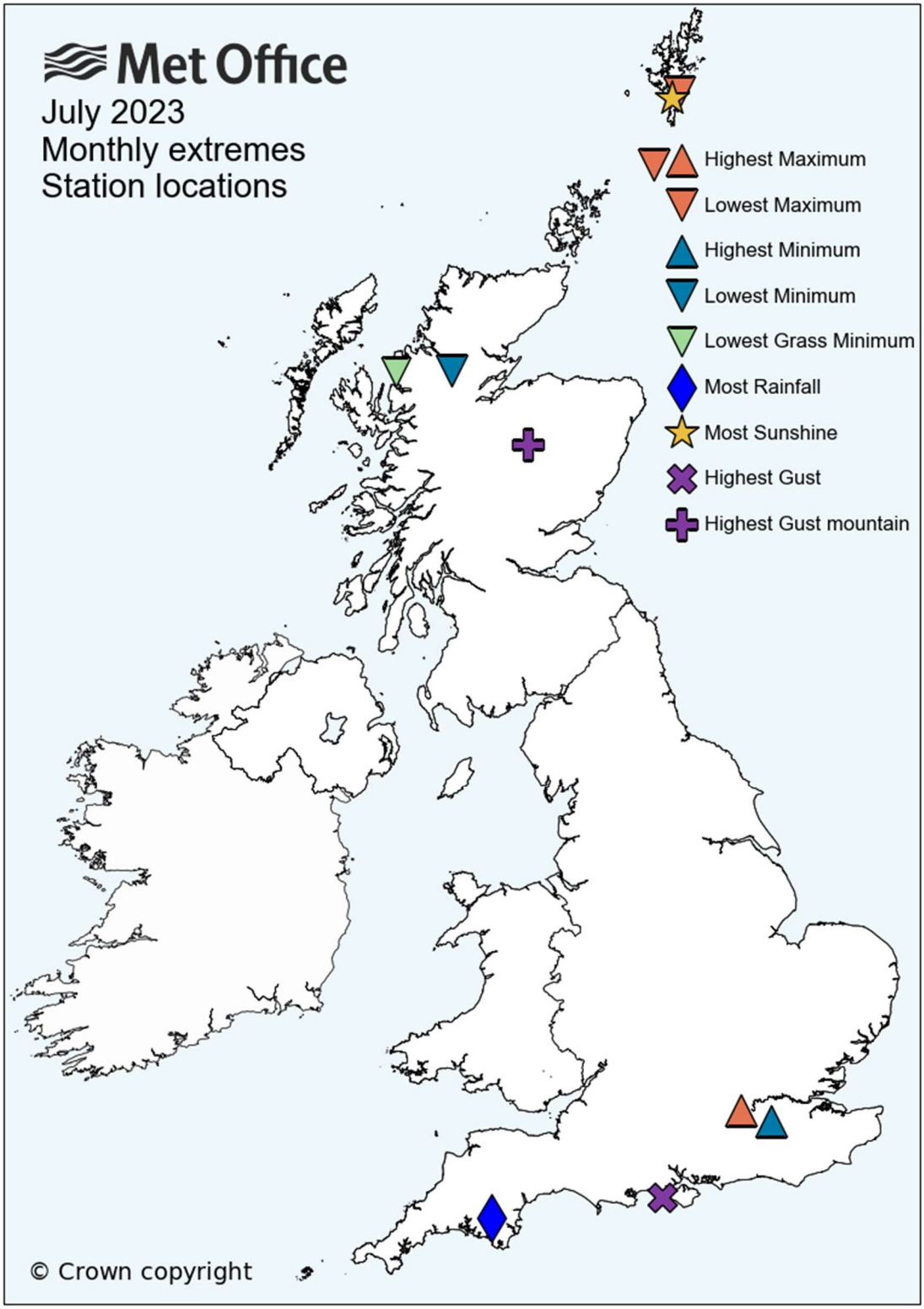
Monthly extremes

The table below lists UK monthly weather extremes recorded at individual weather stations during July 2023 from data available on 04/08/2023. The map shows the location of these stations.

Highest Maximum	**30.2°C** on **7th** at Chertsey, Abbey Mead P Sta (Surrey, 12mAMSL)
Lowest Maximum	**11.0°C** on **19th** at Fair Isle (Shetland, 57mAMSL) and Lerwick (Shetland, 82mAMSL)
Highest Minimum	**19.7°C** on **8th** at Kenley Airfield (Greater London, 170mAMSL)
Lowest Minimum	**1.2°C** on **26th** at Loch Glascarnoch (Ross & Cromarty, 269mAMSL)
Lowest Grass Minimum	**-1.8°C** on **22nd** at Port Henderson (Ross & Cromarty, 18mAMSL)
Most Rainfall	**110.9mm** on **22nd** at White Barrow (Devon, 445mAMSL)
Most Sunshine	**16.1hr** on **8th** at Lerwick (Shetland, 82mAMSL)
Highest Gust	**69Kt 79mph** on **15th** at Wight: Needles Old Battery (Isle Of Wight, 80mAMSL)
Highest Gust (mountain*)	**79Kt 91mph** on **1st** at Cairngorm Summit (Inverness-shire, 1237mAMSL)
Greatest Snow Depth at 0900 UTC	No non-zero values.

mAMSL refers to station elevation in metres above mean sea level.

*Mountain stations are above 500mAMSL.


Met Office
July 2023
Monthly extremes
Station locations
Highest Maximum
Lowest Maximum
Highest Minimum
Lowest Minimum
Lowest Grass Minimum
Most Rainfall
Most Sunshine
Highest Gust
Highest Gust mountain
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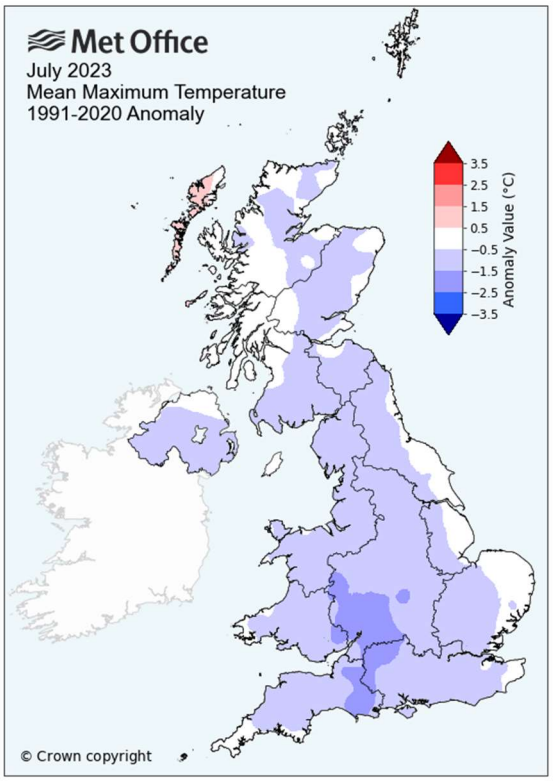
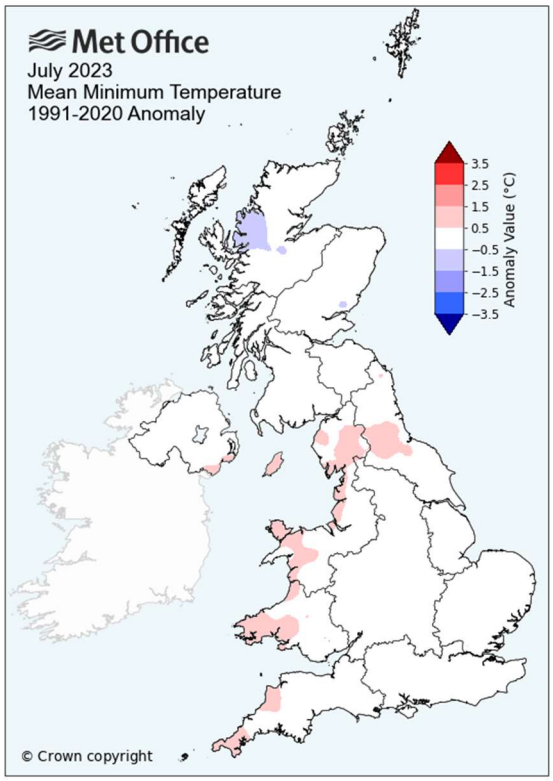
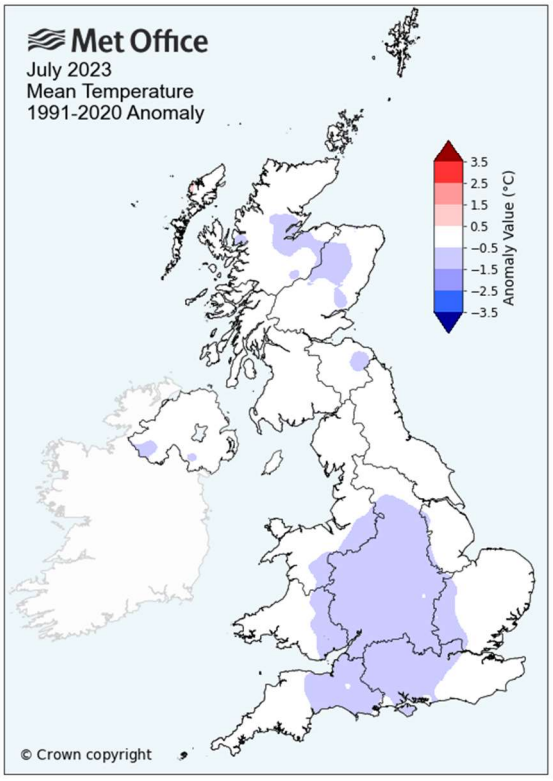
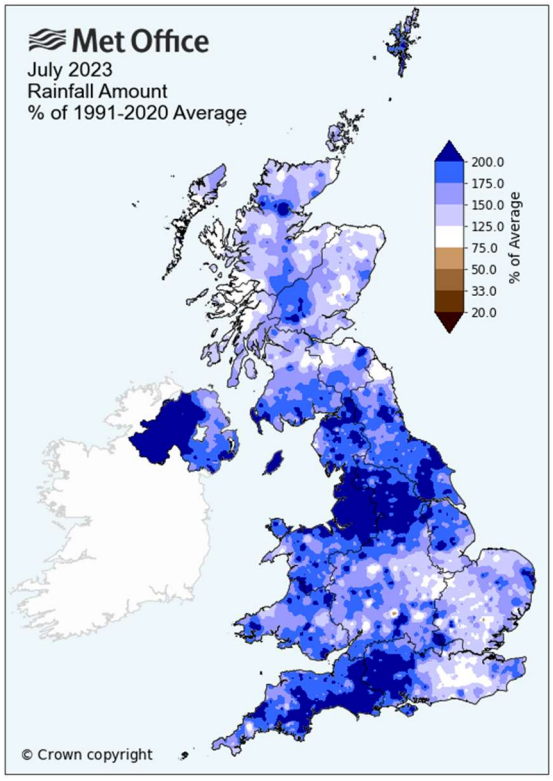
Monthly maps

These maps show monthly average daily maximum, monthly average daily minimum and monthly mean temperature and monthly rainfall for July 2023 as anomalies relative to the July 1991-2020 long term average.

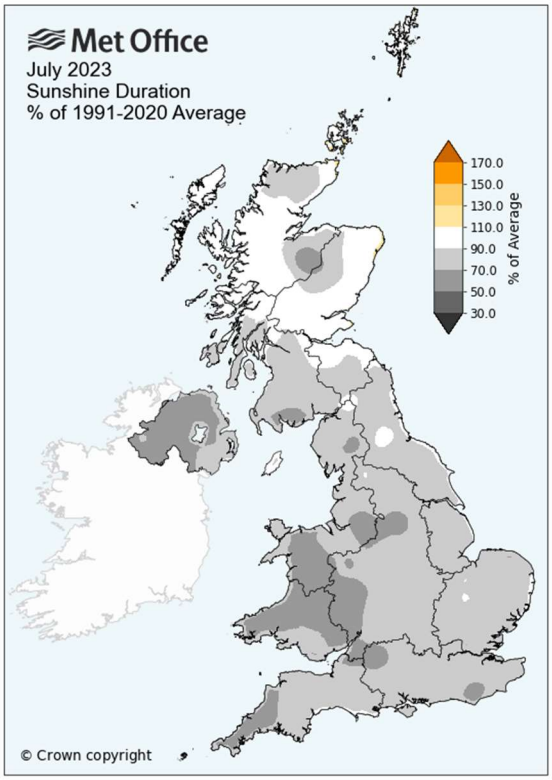


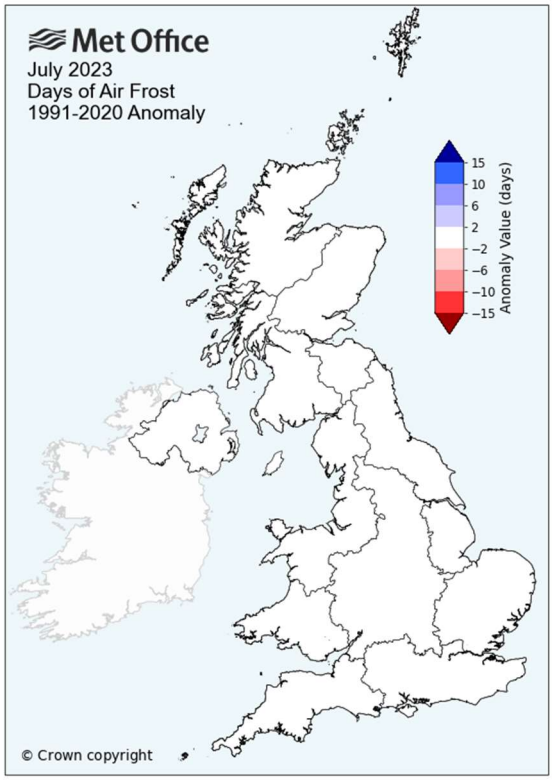


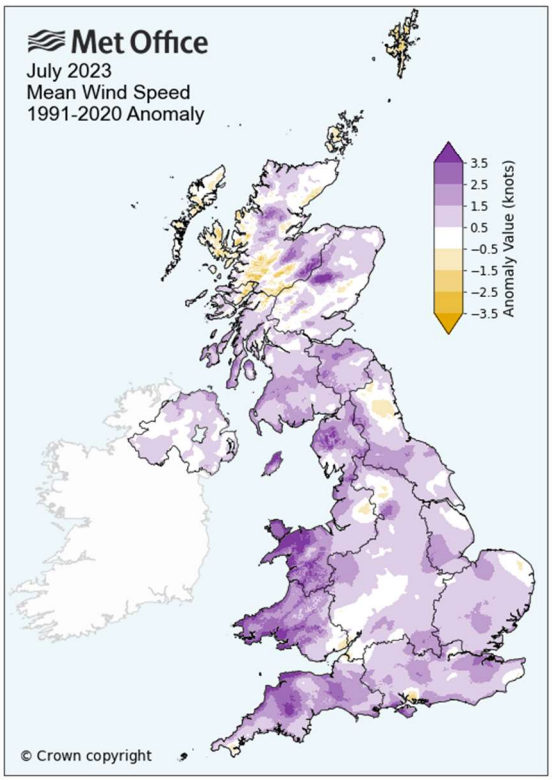


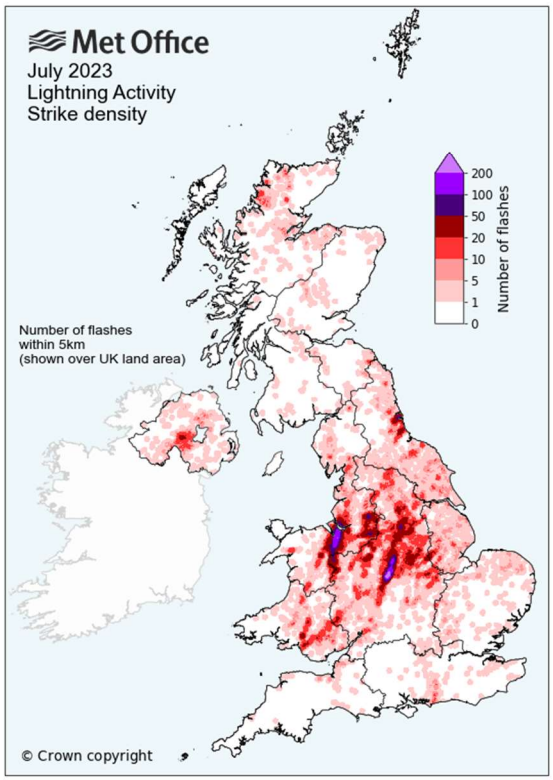


These maps show monthly sunshine, monthly air frost and monthly windspeed for July 2023 as anomalies relative to the July 1991-2020 long term average, plus a map showing lightning activity as the number of strikes within a 5km radius of any land location.









Monthly climate statistics - actuals and anomalies

These tables show the UK and national climate statistics for July 2023 for max, min and mean temperature, rainfall, sunshine and windspeed as actual values and anomalies relative to the July 1991-2020 long term average. The position of the value within the full series (in both ascending and descending order) is shown in the two 'Rank' columns. Central England Temperature (CET) and England & Wales Precipitation (EWP) are also included.

Mean maximum temperature

Region	Maxtemp (°C)	1991-2020 Anomaly (°C)	Rank - warmest	Rank - coldest	Series length (yrs)
UK	18.8	-0.8	64	77	140
England	20.2	-1.0	67	74	140
Wales	18.3	-1.0	78	63	140
Scotland	16.9	-0.4	55	86	140
Northern Ireland	17.9	-0.7	68	73	140
Central England	20.1	-1.3	76	71	146

Mean minimum temperature

Region	Mintemp (°C)	1991-2020 Anomaly (°C)	Rank - warmest	Rank - coldest	Series length (yrs)
UK	11.1	0.1	31	110	140
England	11.9	0.1	26	115	140
Wales	11.7	0.4	19	122	140
Scotland	9.6	-0.1	40	101	140
Northern Ireland	10.9	0.1	31	110	140
Central England	12.1	0.0	51	96	146

Mean temperature

Region	Meantemp (°C)	1991-2020 Anomaly (°C)	Rank - warmest	Rank - coldest	Series length (yrs)
UK	14.9	-0.3	51	90	140
England	16.1	-0.4	49	92	140
Wales	14.9	-0.3	52	89	140
Scotland	13.2	-0.3	50	91	140
Northern Ireland	14.4	-0.3	52	89	140
Central England	16.1	-0.6	138	228	365

Rainfall

Region	Rainfall (mm)	% of 1991-2020 Average	Rank - wettest	Rank - driest	Series length (yrs)
UK	140.1	170	6	183	188
England	120.4	181	10	179	188
Wales	176.7	179	11	178	188
Scotland	155.1	150	8	181	188
Northern Ireland	185.4	207	1	188	188
EWP (England and Wales)	129.6	180	23	236	258

Sunshine

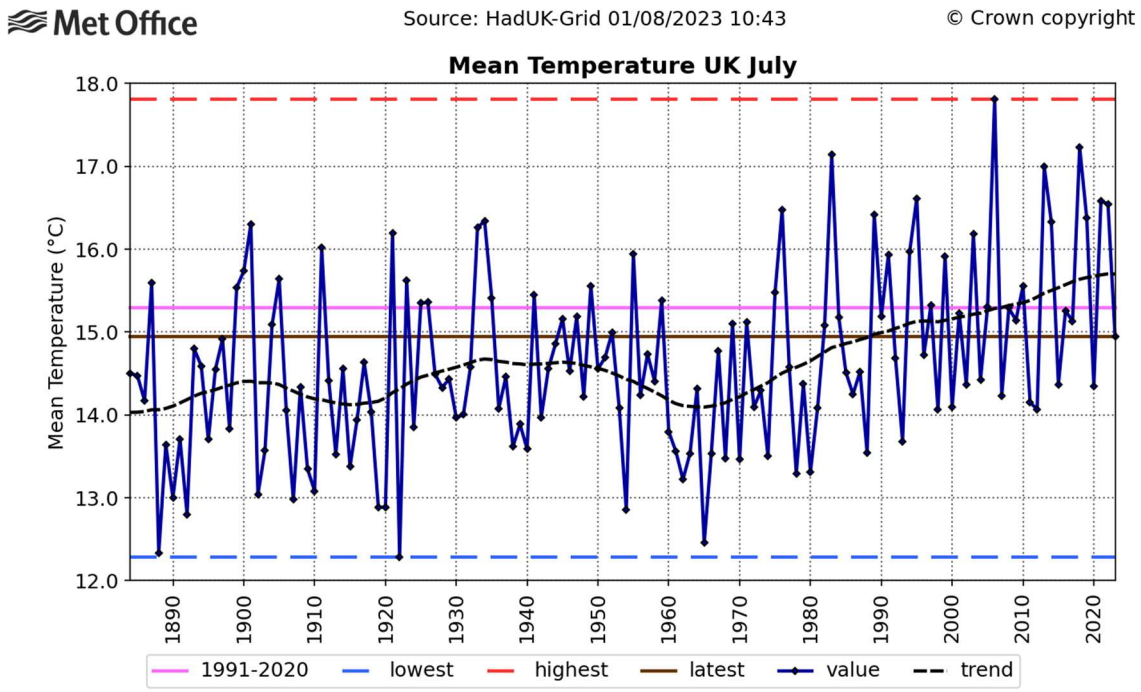
Region	Sunshine (hours)	% of 1991-2020 Average	Rank - sunniest	Rank - dullest	Series length (yrs)
UK	140.3	81	87	28	114
England	155.0	79	87	28	114
Wales	123.2	70	104	11	114
Scotland	128.1	91	71	44	114
Northern Ireland	94.9	70	107	8	114

Windspeed

Region	Windspeed (knots)	1991-2020 Anomaly (knots)	Rank - windiest	Rank - calmest	Series length (yrs)
UK	9.0	1.1	7	49	55
England	8.4	1.2	4	52	55
Wales	10.7	2.5	3	53	55
Scotland	9.6	0.7	17	39	55
Northern Ireland	7.9	0.7	16	40	55

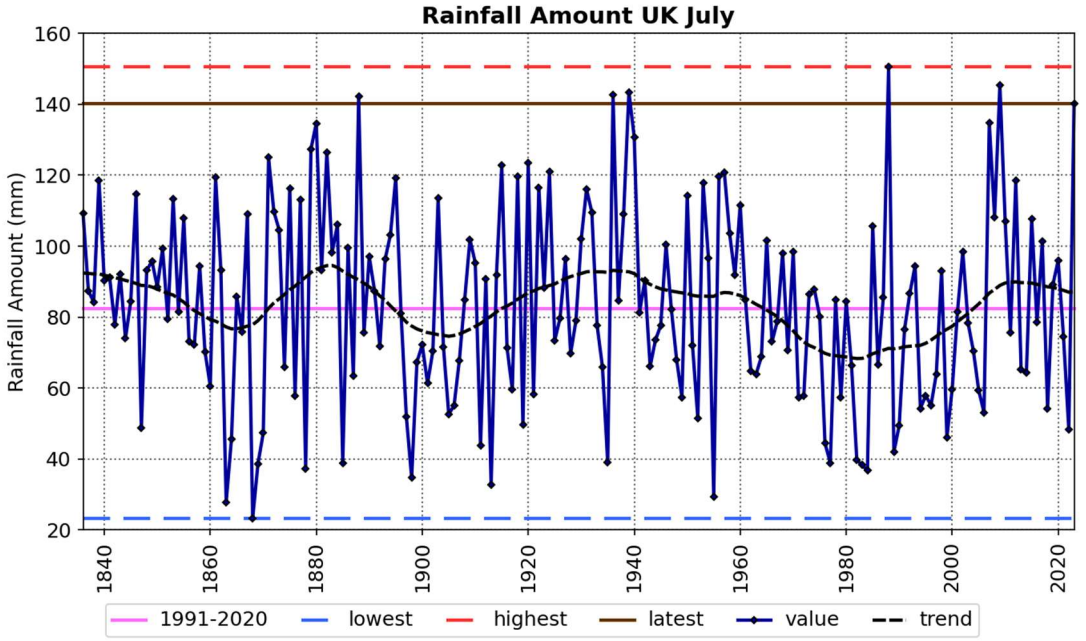
Monthly time-series

These charts show time-series for the UK for July for monthly mean temperature (from 1884), monthly rainfall (from 1836) and monthly sunshine (from 1919). The brown line shows the latest (2023) value. The hatched black line is a smoothing filter which shows the long-term trend. The tables below show statistics for the latest year, latest 10 years 2014-2023, the most recent 30-year climate reference period 1991-2020 and the 30-year baseline climate reference period 1961-1990.



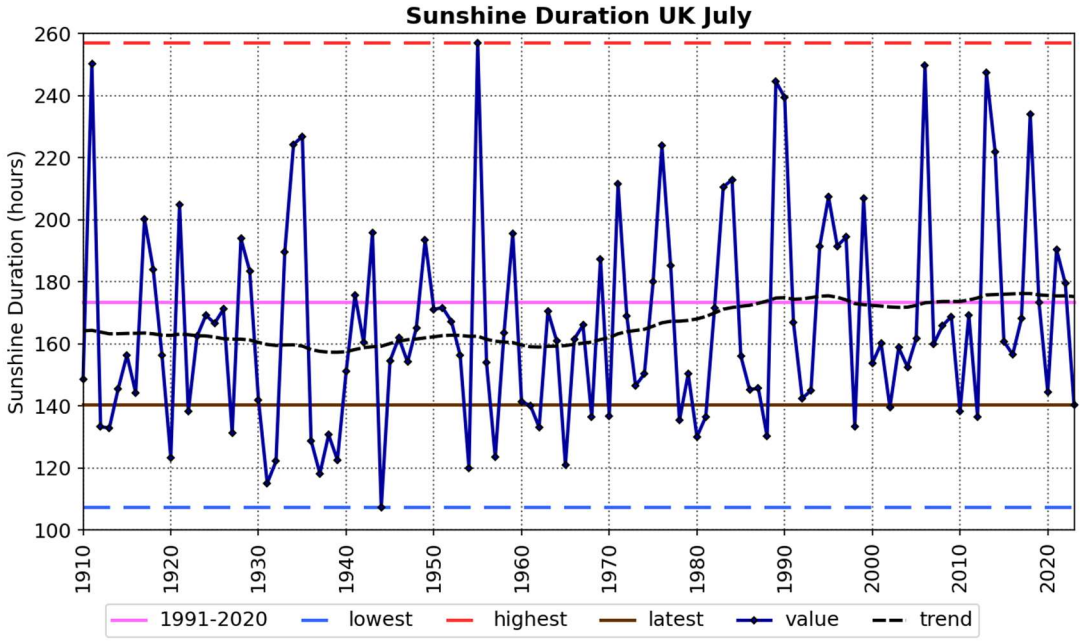
Period	1961-1990	1991-2020	2014-2023	2023
Meantemp (°C)	14.4	15.3	15.7	14.9

Met Office Source: HadUK-Grid 01/08/2023 10:43 © Crown copyright



Period	1961-1990	1991-2020	2014-2023	2023
Rainfall (mm)	72.1	82.5	85.4	140.1

Met Office Source: HadUK-Grid 01/08/2023 10:43 © Crown copyright

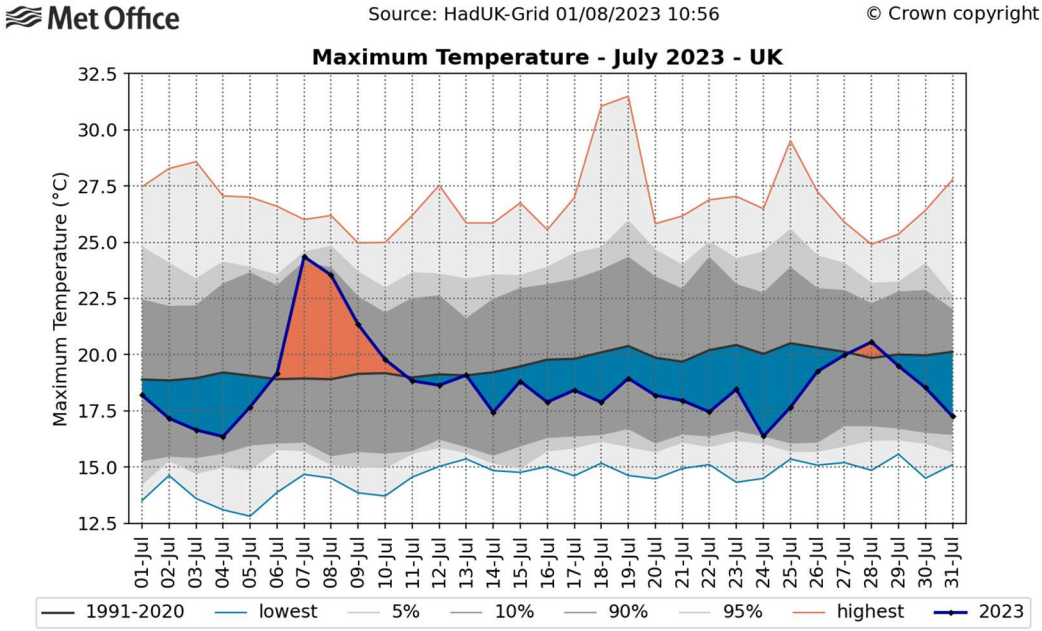


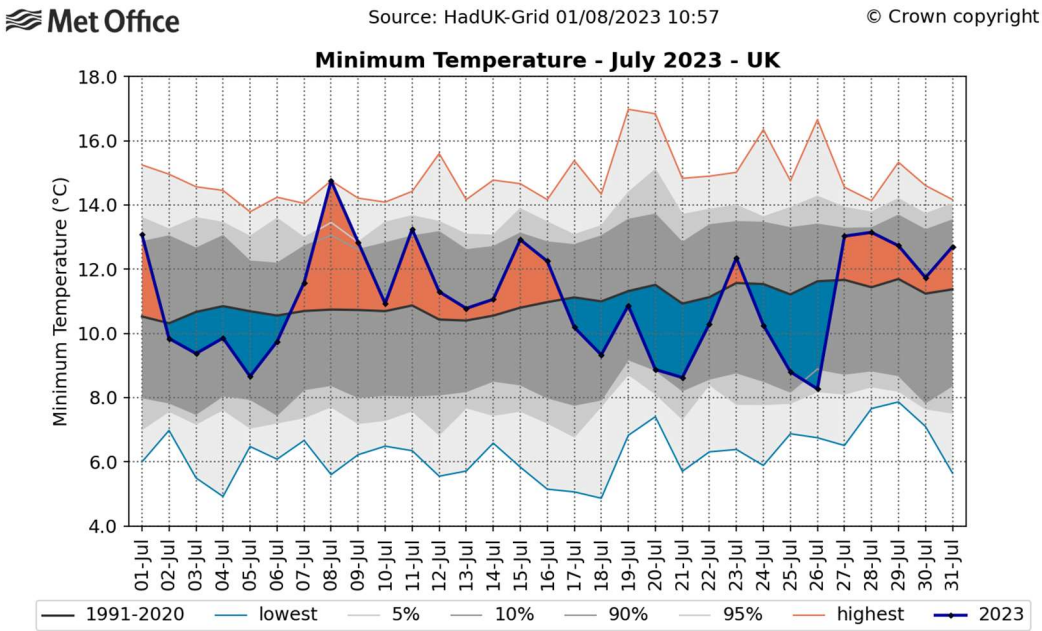
Period	1961-1990	1991-2020	2014-2023	2023
Sunshine (hours)	166.3	173.4	176.9	140.3

Daily time-series

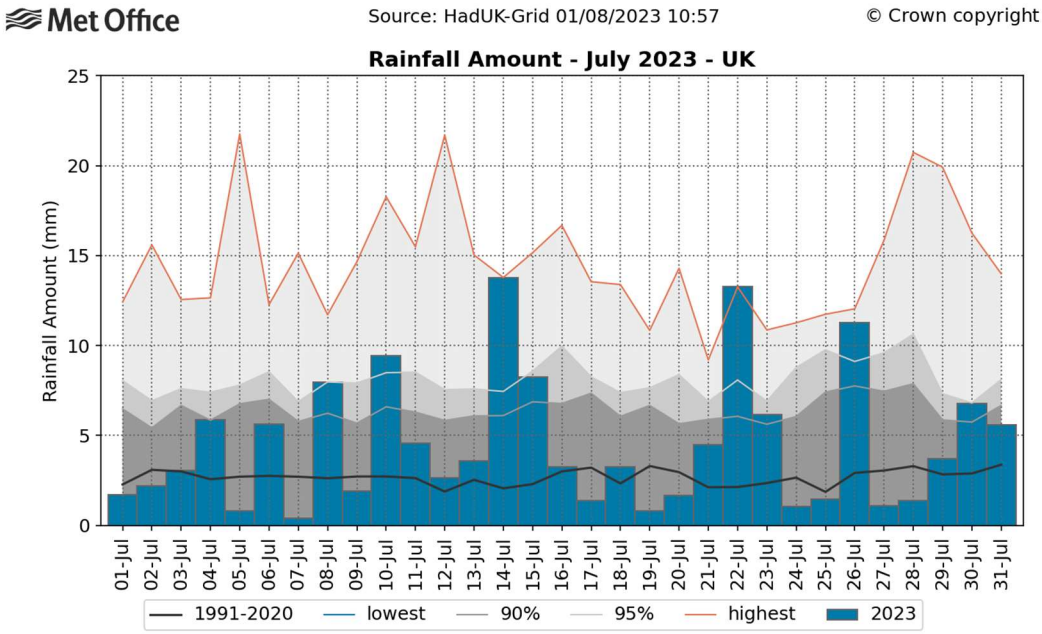
These charts show time-series of UK area-average daily maximum and daily minimum temperature and daily rainfall for each day of July 2023. The areas shaded in grey show the highest and lowest values in the daily temperature series (from 1960) and daily rainfall series (from 1891) together with percentiles and the 1991-2020 long term averages for each day. The rainfall accumulation chart shows the daily rainfall series as an accumulation through the month.

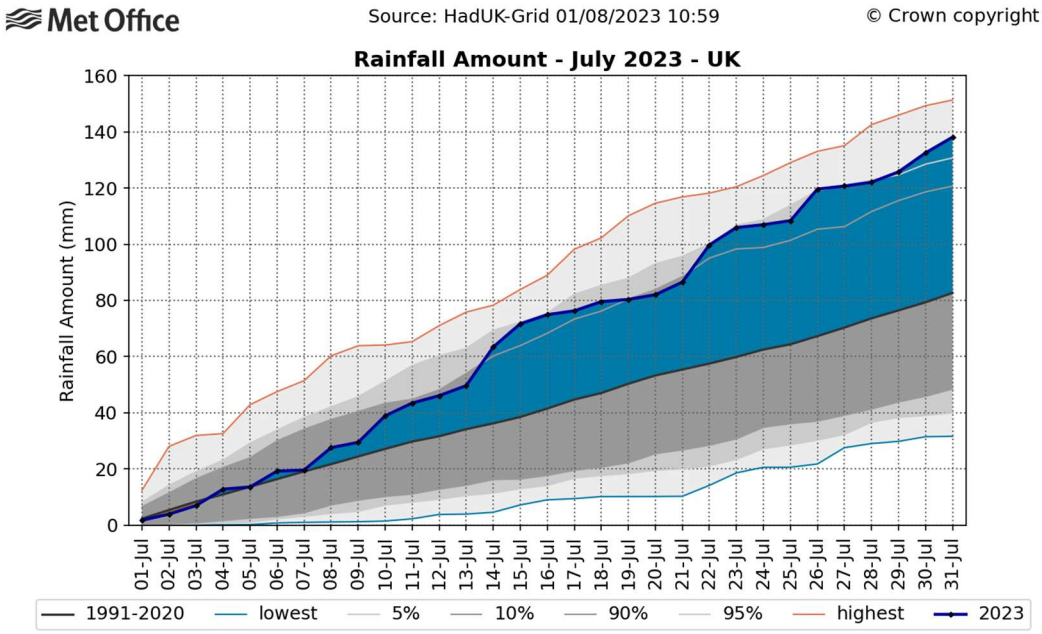
Daily maximum and daily minimum temperature





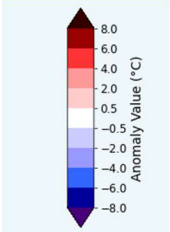
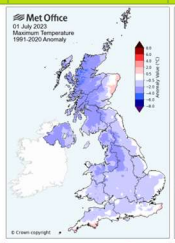
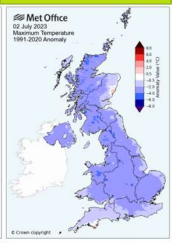
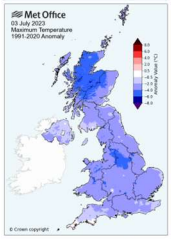
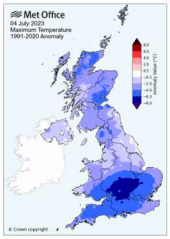
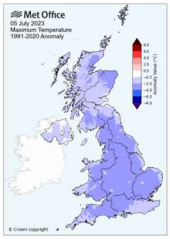
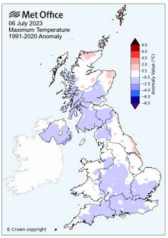
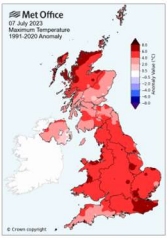
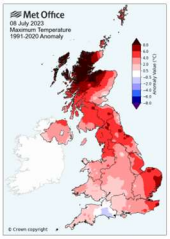
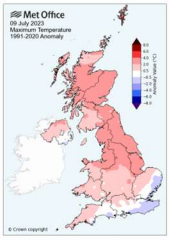
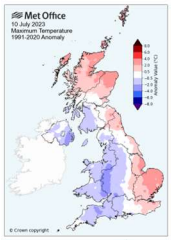
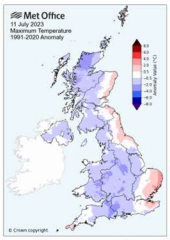
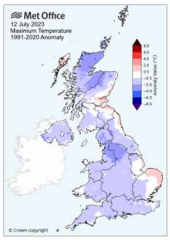
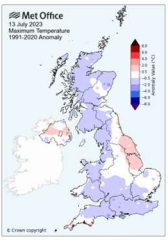
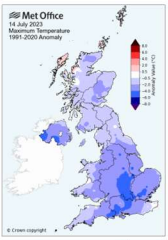
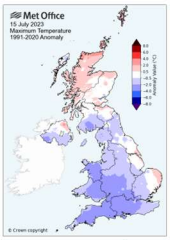
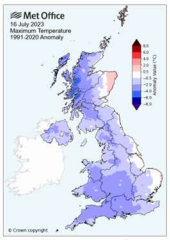
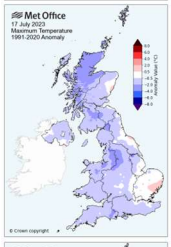
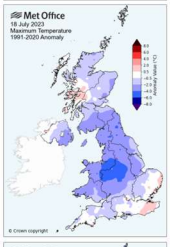
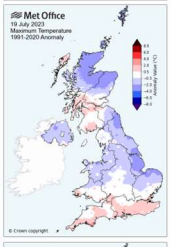
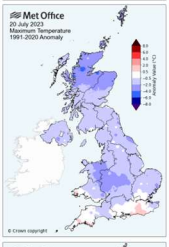
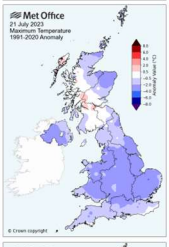
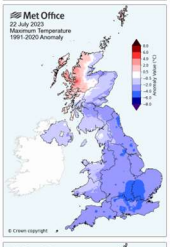
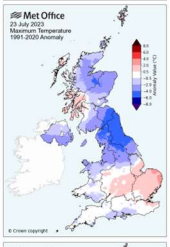
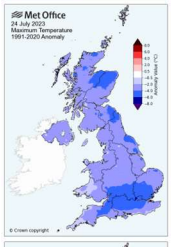
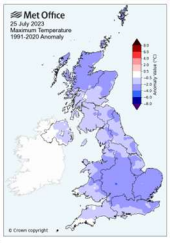
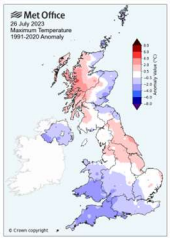
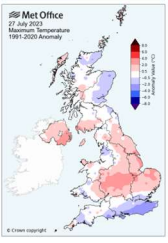
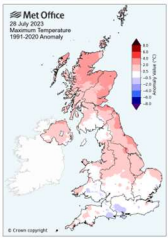
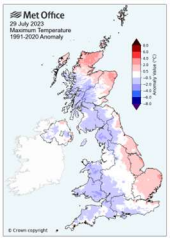
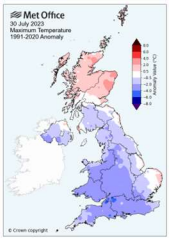
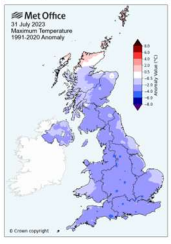
Daily rainfall and rainfall accumulation





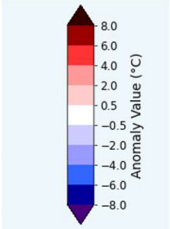
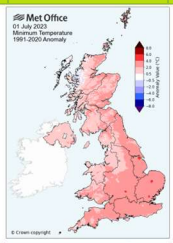
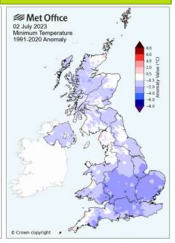
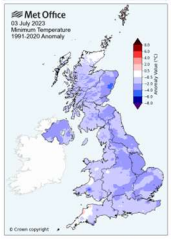
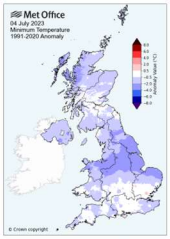
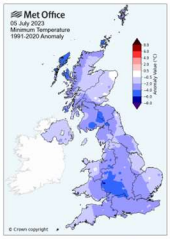
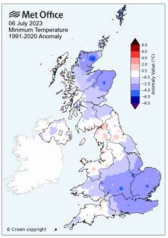
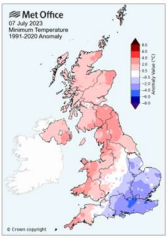
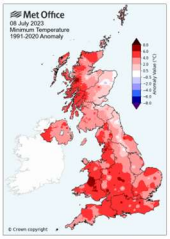
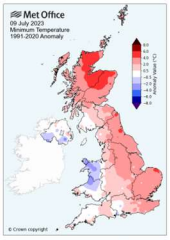
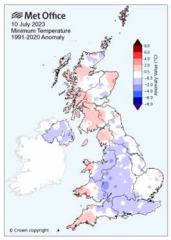
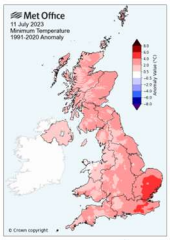
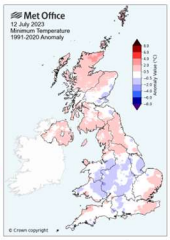
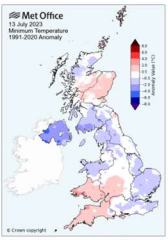
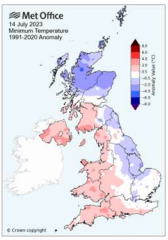
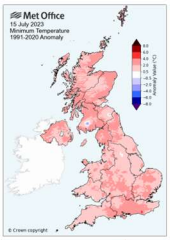
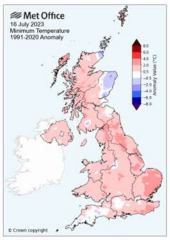
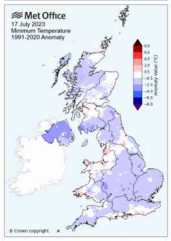
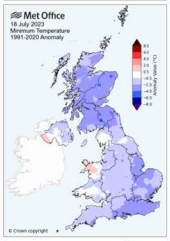
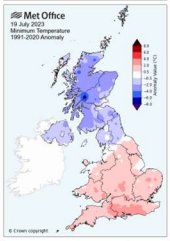
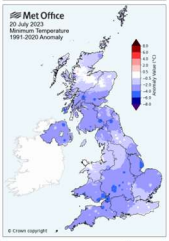
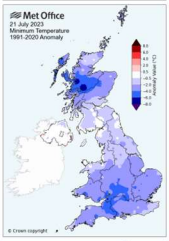
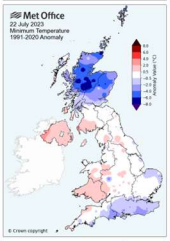
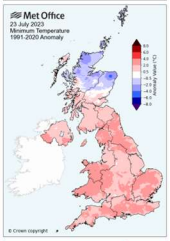
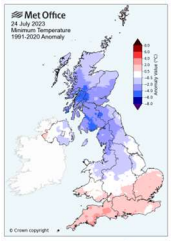
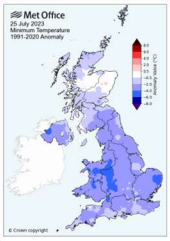
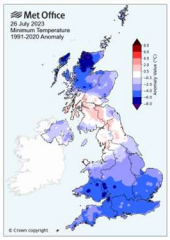
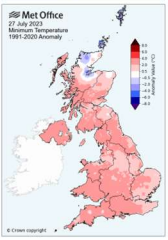
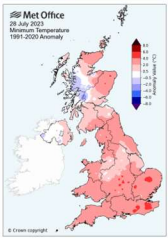
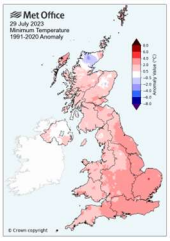
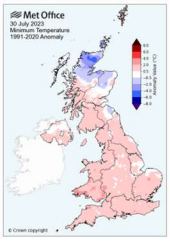
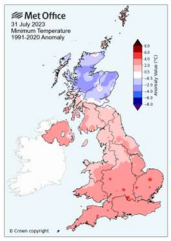
Daily maximum temperature maps - calendar view

These maps show daily maximum temperatures for each day of July 2023 as anomalies relative to the July 1991-2020 long term average. The daily maximum temperature is the maximum from 0900UTC on the day in question to 0900UTC the following day. Normally, the maximum occurs in the early afternoon.

Mon	Tue	Wed	Thu	Fri	Sat	Sun
						
						
						
						
						
						

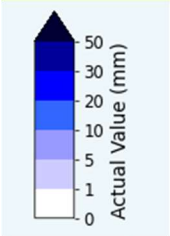
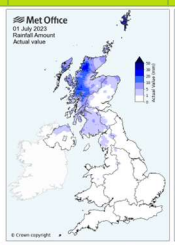
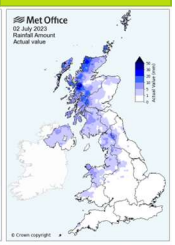
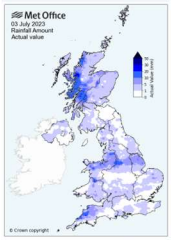
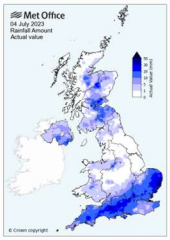
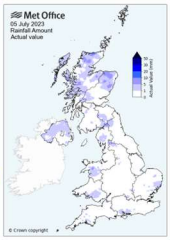
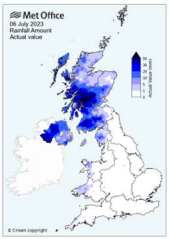
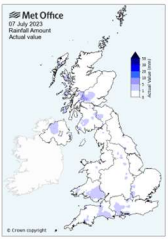
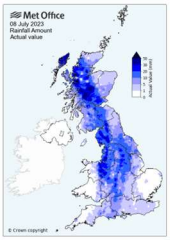
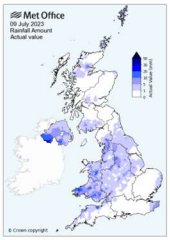
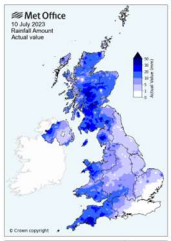
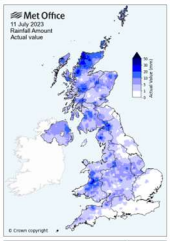
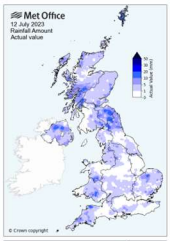
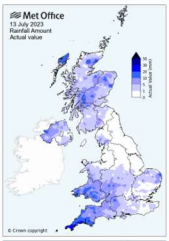
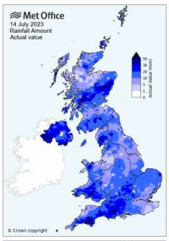
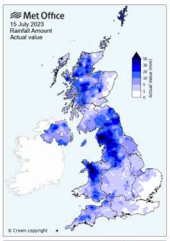
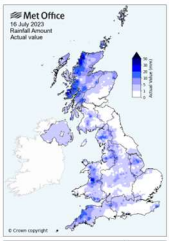
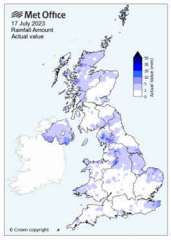
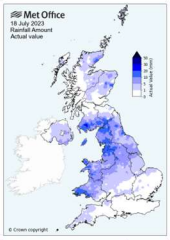
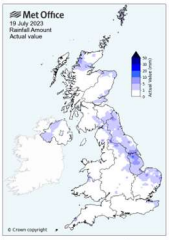
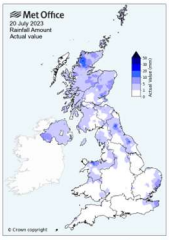
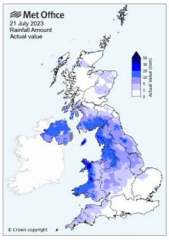
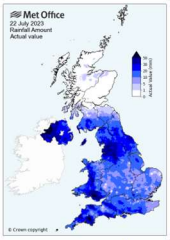
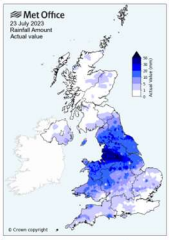
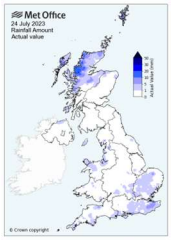
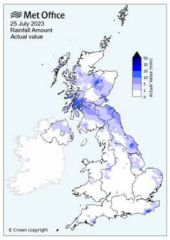
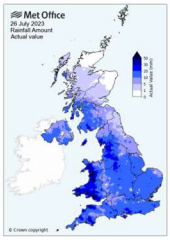
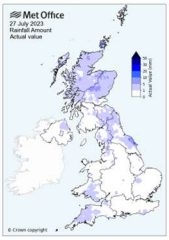
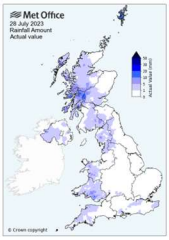
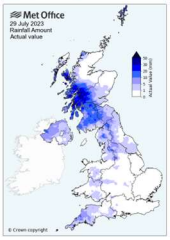
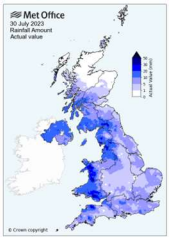
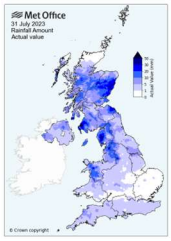
Daily minimum temperature maps - calendar view

These maps show daily minimum temperatures for each day of July 2023 as anomalies relative to the July 1991-2020 long term average. The daily minimum temperature is the minimum from 0900UTC the previous day to 0900UTC on the day in question. Normally, the minimum occurs in the early morning.

Mon	Tue	Wed	Thu	Fri	Sat	Sun
						
						
						
						
						
						

Daily rainfall maps - calendar view

These maps show daily rainfall for each day of July 2023 as daily totals. The daily rainfall is the total from 0900UTC on the day in question to 0900UTC the following day.

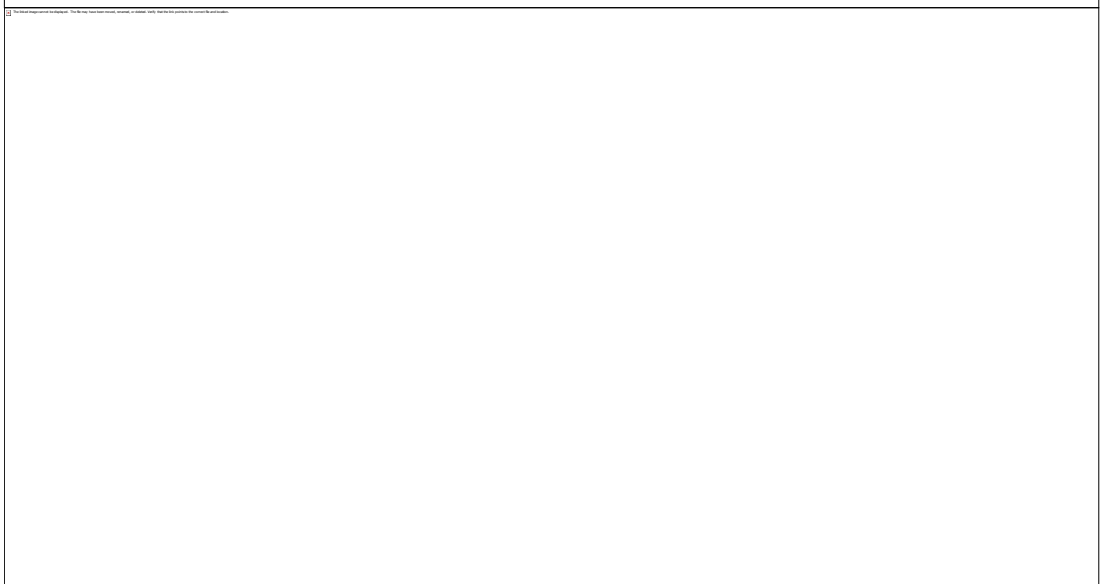
Mon	Tue	Wed	Thu	Fri	Sat	Sun
						
						
						
						
						
						

Monthly atmospheric circulation

Mean sea level pressure

These charts show the monthly mean sea level pressure for July 2023 for the UK and north Atlantic, based on the ERA5 reanalysis (Hersbach et al, 2019), both as actual values and as an anomaly relative to the July long term average. These charts provide an indication of the weather characteristics of the month overall i.e. whether the weather type has been generally settled (high pressure) or unsettled (low pressure) during the month.

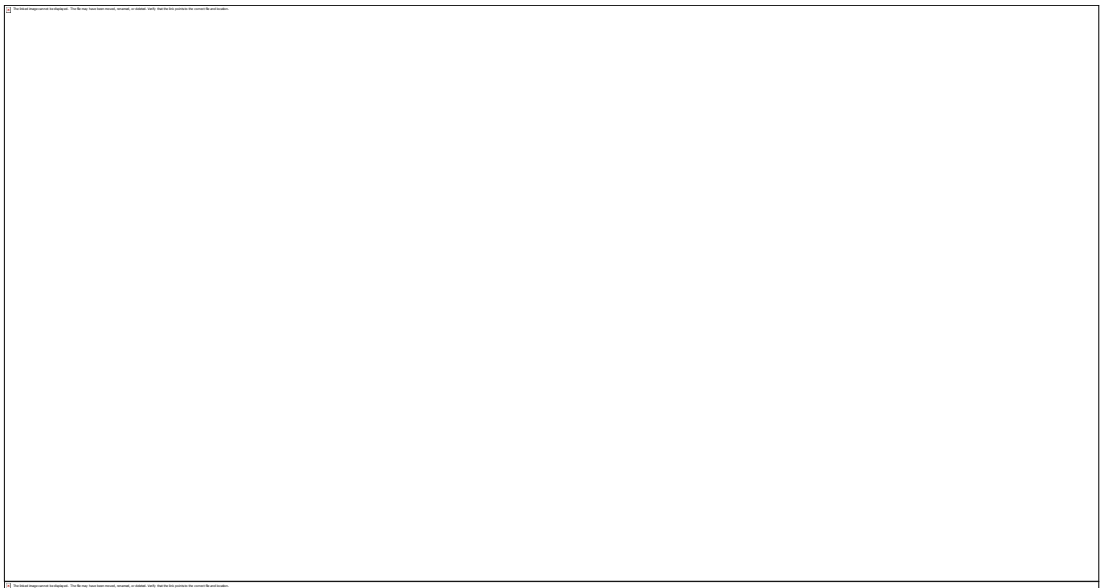
Text not available.

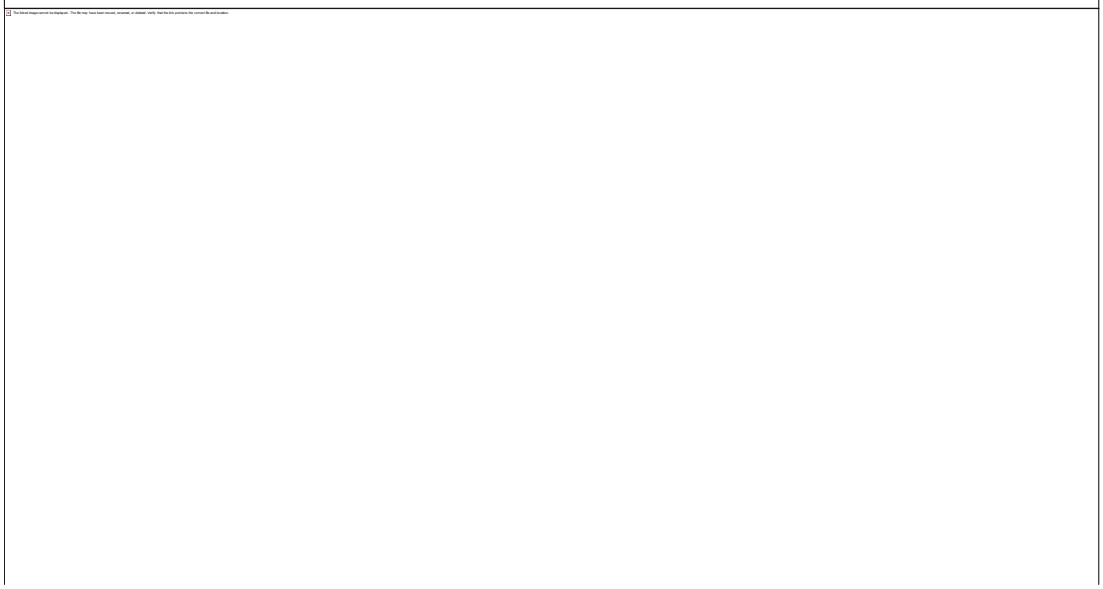


250hPa wind speed and direction

These charts show the monthly 250hPa wind speed and direction for July 2023 for the UK and north Atlantic, based on the ERA5 reanalysis (Hersbach et al, 2019), both as actual values and as an anomaly relative to the July long term average. This provides an indication of the mean strength and position of the jet stream compared to normal. The wind anomaly map shows shaded (scalar) wind speed anomalies with arrows as (vector) wind anomalies.

Text not available.





Weather diary

- **Cool, wet and windy**

Anyone hoping for a month similar to that of July 2022 were to be sadly disappointed, as this month turned out to be unsettled, virtually from start to finish. With low pressure firmly in charge, any settled, dry and warm spells were severely limited. Several stations across England, Wales and Northern Ireland saw their wettest July on record, and a few sites in the southeast recorded their highest gusts.

That said, there was a brief period of warmer weather from the 6th to the 8th, with a continental high pressure extending a ridge across the UK. This drew up some warmth from the south allowing maximum temperatures to climb widely into the high 20s Celsius, and 30.2°C at Chertsey Abbey Mead in Surrey.

A series of depressions crossed the UK for the rest of the month. A particular deep depression on the 15th brought strong winds to most parts, with the south coast bearing the brunt with gusts touching 80mph. On the 22nd, a succession of fronts from another area of low pressure brought significant rainfall to all regions. Numerous sites recorded over 25mm of rain, with parts of Wales and Northern Ireland suffering 3 times that, and a rain-gauge on Dartmoor recording a 24-hour total of 110.9mm.

Notes

The Met Office National Meteorological Library and Archive holds a near-continuous record of monthly weather reports from 1884, and this report forms a continuation of that series. The purpose of each report is to provide an overview of the weather conditions across the UK for that month. The emphasis is mainly based on observations from the surface network of weather stations. Climate series based on from data from these stations are used to provide long term context.

This summary was produced on 04/08/2023 11:14. The statistics are a provisional assessment of the observational data available at the time of production. Ongoing data receipt and quality assurance processes may result in subsequent updates to the statistics presented.

If you have any questions or feedback about this product, spot any data errors or omissions, or wish to obtain further data, please contact the Met Office.

For historical monthly weather reports please visit the Library and Archive.

- The land-surface observations presented in this report are from the Met Office official weather station network which includes both automatic weather stations and manual climate stations operated by volunteer observers. Rainfall data are from the official registered rain-gauge network which includes rain-gauges operated by a number of key partners including the Environment Agency, Scottish Environmental Protection Agency and Northern Ireland Water.
- The observations are carefully managed such that they conform to current best-practice observational standards as defined by the World Meteorological Organization (WMO). The observations also pass through a range of quality assurance procedures at the Met Office before application for climate monitoring.
- Daily and monthly maps, monthly statistics and monthly time-series are primarily based on the HadUK-Grid dataset of 1km resolution UK gridded climate data (Hollis et al, 2019). Monthly statistics from the monthly Central England temperature series 1659 (Manley, 1974) and England and Wales precipitation series from 1766 (Wigley et al, 1984) provide long term context.
- The monthly lightning activity map is based on data from the Met Office ATDnet (Arrival Time Difference Network) system. This is an automatic lightning location network comprising around ten lightning outstation sensors located across Europe.
- The monthly maps of mean sea level pressure and 250hPa wind speed and direction are based on the ERA5 reanalysis (Hersbach et al, 2019). ERA5 is the fifth generation ECMWF reanalysis for the global climate and weather for the past 4 to 7

decades. Reanalysis combines model data with observations from across the world into a globally complete and consistent dataset using the laws of physics.

Hersbach, H., Bell, B., Berrisford, P., Biavati, G., Horányi, A., Muñoz Sabater, J., Nicolas, J., Peubey, C., Radu, R., Rozum, I., Schepers, D., Simmons, A., Soci, C., Dee, D., Thépaut, J-N. (2019): ERA5 monthly averaged data on single levels from 1959 to present. Copernicus Climate Change Service (C3S) Climate Data Store (CDS). https://doi.org/10.24381/cds.f17050d7

Hollis, D, McCarthy, MP, Kendon, M, Legg, T, Simpson, I. HadUK-Grid - A new UK dataset of gridded climate observations. Geosci Data J. 2019; 6: 151-159. https://doi.org/10.1002/gdj3.78

Manley, G. (1974), Central England temperatures: Monthly means 1659 to 1973. Q.J.R. Meteorol. Soc., 100: 389-405. https://doi.org/10.1002/qj.49710042511

Wigley, T.M.L., Lough, J.M. and Jones, P.D. (1984), Spatial patterns of precipitation in England and Wales and a revised, homogeneous England and Wales precipitation series. J. Climatol., 4: 1-25. https://doi.org/10.1002/joc.3370040102

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